



MISSOURI BOTANICAL GARDEN  
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GEORGE ENGELMANN  
BOTANICAL NOTEBOOKS

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Sachs' Botany

The female inflorescences of Coniferae are single flowers as well as the male is called strobili. This is stated in so many words, but is not further explained <sup>but see below</sup>.

A peculiarity which distinguishes the pollen grain of Coniferae from that of Angiosperms lies in the rupture and final stripping off of the cuticularized extine by the swelling of its intine.



They're intine swollen by water extine stripped



They're Pollen before the escape from the Pollen Sac

Taxodium has two erect ovaries like Thuja. [Dr. Prad. has the same also Beeth & Hook Sachs p. 452 Engl. J. In Abietinae the well known Cones are the female flowers (or rather fruits) - the whorled scales appear as axillary structures in the axils of bracts which spring from the axis of the cone. The semi-coniferous scale arises at first as a protuberance of the base of the bract, and is therefore not axillary - the semi-coniferous scale must therefore be considered as a greatly developed

|| placenta growing out of a carpel, which may be small or even abortive.

In a footnote Braun's & other's views are ventilated, also in the context p. 453

|| Van Tieghem in a note to the French translation says that the basal boundary <sup>of the scale</sup> ~~same~~ from the main axis and not from the bract, as it ought to be if the bract scale was an appendage to the bract? the carpellary scale is therefore the only (!!) leaf organ of a suppressed axillary branch. This distinguishes (amongst other characters) Coniferae from Cyrtocarpus, where the bract itself is the carpellary scale.





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Cambridge Oct 7 1883

Coniferous wood

(This part is wanting in the french translation)

Sachs Botany. The substance of the wood of the stem is formed from the descending bundles which, at first isolated, soon coalesce into a closed ring by portions of cambium which cross the medullary rays. The primary wood or xylem, termed the medullary sheath, which consists of the xylem portions of the descending arms of the common bundles, contains (in all gymnosperms as well as in Dicotyledons) long narrow vessels with annular or spiral thickening bands, while further outward occur scalariform or reticulately thickened vessels.

The secondary wood produced from the Cambium ring after the cessation of the length-growth consists in gymnosperms of long tracheides grown into one another in a prosenchymatous manner with a few large bordered pits. This secondary wood is distinguished from that of the Dicotyledons that it is composed only of such prosenchymatous cells (wood parenchyma not or scarcely formed) and the wide dotted vessels composed of short cells are wanting with punctate the dense narrow celled masses of the wood of Dicotyledons.

The bordered pits of Conifers are usually developed only on the wall which faces the medullary rays, in one or two rows, but in *Araucaria* densely crowded.

The medullary rays in Conifers are very narrow, often only one cell; the cells are strongly lignified and their lateral faces in contact with the adjoining tracheids are provided with closed dots.

The Ploem of the fibrovascular bundles is similar to that of Dicotyledons.

Separating intercellular passages are widely distributed; carrying gum in *Cycadeae* and resin in Conifers and oil of turpentine - these occur in the pith, in the wood, and in the primary and secondary cortex and in the leaves. In *Fagus* the resin canals are wanting.

- Ventrignan says:
1. no canals in root or stem: *Fagus*
  2. none in root, but in cortical parenchyma of stem: *Cryptomeria*, *Taxodium*
  3. none in root, canals in cortical parenchyma and pith of stem: *Salix*, *Salix*
  4. canal in root and in parenchyma of stem: *Cedrus*, *Abies*, *Pseudotsuga*
  5. canals in the fibrovascular bundles of stem and root and in cortical parenchyma of stem: *Pinus larix*, *Pinus*, *Pseudotsuga*
  6. canals in the liber of the fibrovascular bundles of stem and root and of cortical parenchyma of stem: *Araucaria*, *Widdringtonia*, *Thuja*, *Cupressus*, *Brista*.



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Coniferae

Cambridge Oct 4 1883

Sachs' Botany

Structure

Fibrovascular bundles similar to those of Dicotyledons



Transverse section through stem of *Pinus Pinaster* x 200

xx 2 guard cells of the stomata, sp. its pore, v. its entrance

c. lacuna or air cavity

c. cuticularized layers of epidermis

i. "inner thickening layers of the cells beneath the epidermis"

[What I call strengthening cells, and what Schwandener seems to call mechanical cells]

g chlorophyll <sup>filled</sup> parenchyma cells

"Hypodermis consists of layers or bundles of thick-walled sclerenchyma-cells, sometimes even of cordlike fibres"

Pollentulae of *Conifer* penetrate a short distance into the micropyle and thicken (widening) those with annual fertilization it develops further after a few weeks in those with biennial maturation they rest till the following June, when the further development takes place and the thin antheridium of the tube penetrates through the nucellus to the embryo sac, and attaches itself firmly to the cells of the neck of the archegonium.

(What we are in the habit of calling bark is here called carpel scale, and our carpel-scale is here pleurotaxy excrecence)



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*Pinus* Lin. Endl. Parlat.

*Pinus* Abies & Larix Fourn

*Pinus*, Abies Lin. Fourn Rich.

*Pinus* Picea Abies Larix Cedrus Link. Linn. D.

*Pinus* Abies Cedrus Larix Speck

*Pinus* Tsuga Abies Picea Larix Cedrus *Pinus* Camier

*Pinus* Abies Cedrus Larix Picea Pseudolarix Jord

*Pinus* Larix Pseudolarix Cedrus Abies Henkel & Koch

*Pinus* Keteleeria Tsuga Pseudotsuga Abies  
Picea Larix Pseudolarix Cedrus  
Camier & 2

Contents of genera of *Pinus* *Conif* & 2 1867

<i>Pinus</i>	Parlaton	Sp. 1-66.	p. 378-406
Abies	4	Sp. 88-105	418-427
Picea	4	Sp. 78-87	413-418
Larix	4	Sp. 69-76	p. 409-412
Cedrus	Parlat	Sp. 67-68	p. 407-408
Tsuga	4	106-110	428-430
Pseudotsuga	4	111	Douglasii p. 430
Pseudolarix	4	Sp. 87.	p. 412
Keteleeria	4	112	Fortunei p. 430

1868 Tutinore writes Pseudotsuga & Keteleeria  
with Tsuga, and divides

- Pinus*
1. *Pinus* p. 378
  2. *Sapinus* 407
    1. Cedrus
    2. Larix
    3. Pseudolarix
    4. Picea
    5. Abies
    6. Tsuga



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# American Central Insurance Company

OF ST. LOUIS.

St. Louis, Mo. 29 1874

Mr. Engelman. Will you please advise  
how you bill  
Palmer  
Sept 9 1874  
Rayburn Max Reed

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Dec 1883

sent to Sargent almost all my sketches

of Pinus

Abies

Picea

Tsuga

Pseudotsuga

Sciadopitys

To be returned

(Kept numbers of tally)



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Cambridge Oct 14 '76

Sanio, Quatani, Pinus silvestris, Pringsheim Archiv 9 vol 1873

p. 115 - autumnal and vernal wood (see Mohl in Bot Zeit. 1852/238)

Sanio finds other laws than Mohl. He says that in vigorous growth the harder autumnal wood is not so much increased than the softer vernal wood.

But Sanio finds that the difference in both kinds of wood <sup>is based on</sup> consist <sup>in the</sup> the height of the section above the base. The autumnal wood <sup>harder</sup> ~~decreases~~ with the height, and the vernal softer wood increases. In a 130 year old

trunk the

Autumn.	:	Spring wood	one - 4 meters above base =	1 : 2 1/2
"	"	"	6 - 8 " " " "	1 : 3
"	"	"	10 - 12 " " " "	1 : 4
"	"	"	14 - 20 " " " "	1 : 5
"	"	"	24 - 26 " " " "	1 : 7
"	"	"	27 " " " "	1 : 10

Therefore wood near the base stronger and heavier than higher up, makes better firewood - In other species the proportions of aut. & vernal wood is different 1:2, 1:1 1/2 and even 1:1





*H. tri-alata* Buckley, l.c.,  
with 3-winged samaras.

Trust, 1808, 209; Gray, Man., ed. 2, 358.

*H. concolor*, Muhl. Cat.; Torr. Fl.

N. Y. t. 99. (*H. pubescens* in letter press).

*H. juglandifolia*, Willd. Spec. iv, 1104;

*H. Caroliniana*, Willd.? Pursh, Fl. 1, 9,

not Lam. *H. expansa*, Willd. ~~Sam.~~

Baum. 150. *H. Berlandieriana*,

De. Prod. viii. 278, var. with leaflets

(mostly 5) cuneate at base. (The fruits

of *H. viridis* & *H. Americana* seem to

have been interchanged in the plates

of Michx. f. Sylv.) — Along streams,

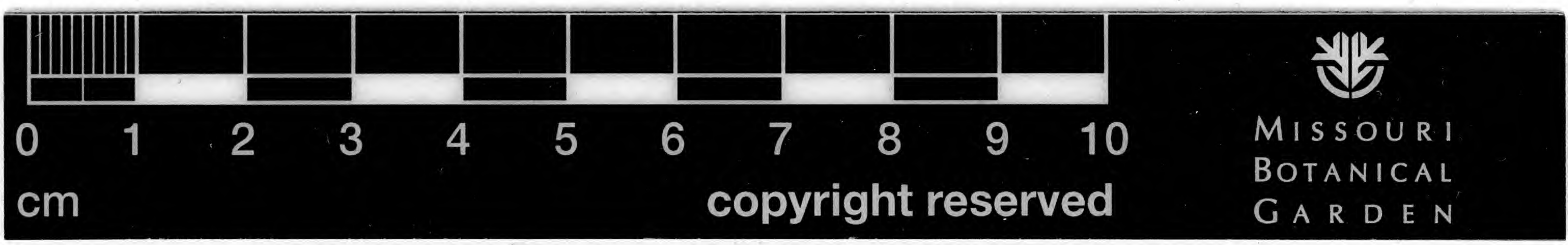
Canada West and Dakota to Florida,

Texas, and Arizona. (Mex.? Cuba.)

*H. pubescens* var.

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Linne *Mass. cal. 4-phyllus*  
(*Abies m. cal. - Gemma*)

2 lateral, keeled

then 3<sup>rd</sup> ~~dorsal~~ ventral (toward axis of inflorescence)

4<sup>th</sup> dorsal toward base →



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Jan 1875

*Abies* Link Linn. XV. 525 (1841)

Cited from ap. London

*Tsuga* Endl. sub *Pino* Carrion Conif. ed 1

p. 185  
(1855)

*Pseudotsuga* Carr. Conif. ed 2 p. 256 1867

*Hesperotsuga* Engelm. Bot. Jour. Calif. 1868

*Picea* Link l.c. 516 (1841)

Cited from ap. London

*Pinus* Lin Gen. ed 1. n 231

A. acutor. plus



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*Faint handwritten notes, possibly including botanical names and dates.*

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